Isomer Classification

Comparing two molecules

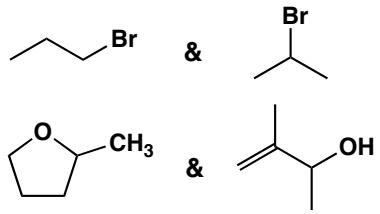
Do they have the same *formula* ?

- **NO** → **non-isomeric compounds**
- **YES** → **ISOMERS**

Do they have the same *connectivity?*

- **NO** → **CONSTITUTIONAL ISOMERS (structural isomers)**

e.g.



- **YES** → **STEREOISOMERS**

Isomers that have the same connectivity but differ in their spatial arrangement of atoms.

Can the structures be interconverted by rotation around σ-bonds ?

- **NO** → **CONFIGURATIONAL ISOMERS**

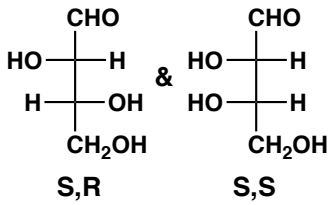
Are they non-superimposable mirror images of each other ?

- **NO** → **DIASTEREOMERS**

Stereoisomers that are non-superimposable, non-mirror images of each other.

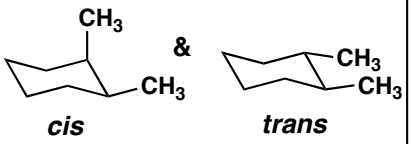
e.g.

more than 1 stereocenter



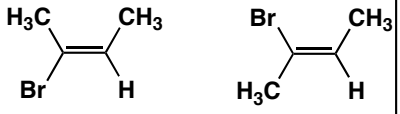
S,R S,S

cyclic cmpds



cis *trans*

alkenes

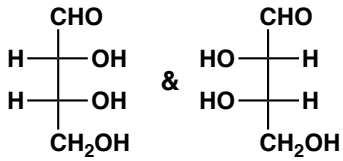


E Z

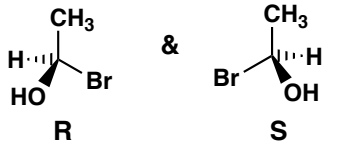
- **YES** → **ENANTIOMERS**

Stereoisomers that are non-superimposable mirror images of each other.

e.g.



R,R S,S

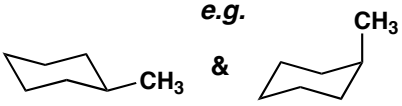


R S

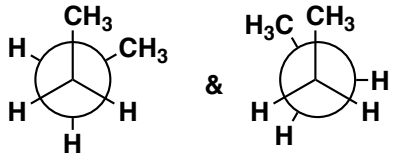
- **YES** → **CONFORMATIONAL ISOMERS**

Stereoisomers that are superimposable by sigma bond rotation(s).

e.g.



equitorial axial



gauche staggered eclipsed

chair boat

KC Russell, NKU, 2013